AMATEUR SATELLITE REPORT

Number 165
December 28, 1987

Editor: Vern Riportella, WA2LQQ
Contr. Editors:
Pete Killingsworth, KD7WZ
Managing Editor: Bob Myers, W1XT

AMSAT® NA *Newsletter for the Amateur Radio Space Program*

Amateur Satellite Report is endorsed by the American Radio Relay League as the special interest Newsletter serving the Amateur Radio Satellite Community

Copyright 1987 by AMSAT® NA, The Radio Amateur Satellite Corporation. AMSAT® is a registered trademark.

PACSAT Design Converges At Washington Meeting

The AMSAT-NA PACSAT design team met at AMSAT headquarters the weekend of December 5 to advance the design of AMSAT's new PACSAT concept. Leaders from AMSAT, TAPR and San Diego packet radio groups attended. Spokesman expressed satisfaction at the progress and felt substantial agreement had emerged on major elements of the digital design. Attendees included Tom Clark, Jan King, Bob McGwier, Phil Karn and Lyle Johnson among a group of about 10.

Meanwhile in England, designers are pressing forward on an urgent basis with the design of UoSAT-C. It will contain the VITA/PACSAT experiment together with several other experiments designed by engineers at the University of Surrey's satellite engineering laboratory. There has been discussion of using the AMSAT/TAPR-designed PACSAT in UoSAT-C for the VITA experiment but several variables remain undetermined. Foremost among these is the need for VITA to receive authorization for spectrum usage. UoSAT-C is targeted for a 1988 launch. VITA recently received a grant for a PACSAT. VITA's planned mode of use of its PACSAT render its utility use on Amateur Radio frequencies unlikely.

"PACSAT" has evolved into a generic term recently. VITA's PACSAT would be part of UoSAT-C being built at Surrey. AMSAT-NA's PACSAT is a multi-use package which could be flown on UoSAT-C as well as a host of other options now being explored.

AMSAT officials expressed cautious optimism its PACSAT project would soon be launched too. Unfortunately, one of the launch prospects AMSAT-NA believed possible has been adversely affected by the recent stock market crash. American Rocket Company, AMROC, of California had promised AMSAT a ride on its 1989 debut launch. The AMSAT PACSAT would have been integrated by Globesat Express of Utah with a satellite of its own onto the AMROC rocket.

However, the October Wall Street disaster has undermined AMROC's financing. According to *Aviation Week* magazine, AMROC has dismissed virtually all of its employees. Spokesman for AMROC were quoted as being optimistic about new financing. At press time AMROC was back in business and AMSAT thought it might proceed with talks although a 1989 launch seems less likely. Nevertheless, AMSAT officials said they were aware of potential additional launch opportunities for its PACSAT and felt continuation of its "crash" project was justified.

AMSAT spokesman said the new PACSAT being designed by AMSAT and TAPR would provide a degree of functionality and reliability long sought but not yet attained in the packet experiments so far launched.

Meeting In Ottawa To Advance Nordski Plans

On December 12 a contingent of AMSAT leaders from the U.S. traveled to Ottawa to meet with Leo, UA3CR and Vasily, RW3DR to discuss plans for the Skitrek polar expedition as well as potential future joint satellite projects between AMSAT-NA and AMSAT-UA. The meeting in Ottawa was arranged by AMSAT's John Henry, VE2VQ, who has acted as AMSAT's liaison to the expedition and to CRRL which is coordinating the overall expedition radio activity in Canada.

Leo and Vasily returned to Ottawa on December 11 after several weeks of training at Frobisher Bay on Baffin Island, Canada. The primary purpose of the Frobisher station is to support the actual skiers beginning next March. Then skiers will travel from the USSR to Canada across the North Pole in a trek that will take up to 3 monz s.

Digitalker tests with UoSat OSCAR 9 were successful with UA3CR reporting he heard the voice synthesizer quite well on an HT at Frobisher. The Digitalker demonstrations and tests for the Polar Expedition were arranged by Surrey at UA3CR's request between December 5 through 10. During the actual Skitrek next Spring, UO-9 or UO-11 will relay navigational information to the Skitrek team. The position of the team will be determined using the COSPAS/SARSAT satellites. The results of the analysis will be uplinked to UoSAT and thence to the skiers in digitized voice. Digitalker is heard on the normal UoSAT downlink of 145.825 MHz, FM.

AMSAT and Surrey are supporting the program under

their Project Nordski Comm. Educators around the world have expressed interest in receiving the UoSAT Digitalker downlink and in plotting the progress of the Skitrek team on maps.

ICOM America has supplied the Project Nordski Comm with a pair of micro 2AT 2 meter HTs for use during the expedition. The trekkers will use them to listen for the UO-11 Digitalker. Small enough to be carried in a shirt pocket, they have been demonstrated to work well in the expected extreme low temperatures of the polar clime.

ARRL Seeks Lab Supervisor

An immediate opening exists in the Technical Department at ARRL HQ for a Laboratory Supervisor. They are looking for a licensed and experienced amateur with a BSEE degree, or equivalent experience. A candidate must have sufficient experience in industry to know laboratory procedures and test standards, and must have the ability to train and counsel laboratory personnel. The ideal candidate would have a (analog/digital and hardware/software) design background, and an ability to work with experimenters in the field. Contact Chuck Hutchinson, K8CH at 203-666-1541 for further details.

Launch Insurance Fund Reaches Milestone

Thanks to the leadership of affiliated AMSAT organizations and the generosity of a growing number of individuals, AMSAT NA's Phase 3C Launch Insurance Campaign recently passed the 50% mark with over $5,000 committed to the fund. The fund aims to insure the new spacecraft against any loss due to launch or deployment problems.

Recent major donations of $1,000 each have been received from Brazil AMSAT under the leadership of Junior DeCastro, PY2BJO, and from AMSAT UK under the leadership of Ron Broadbent, G3AAJ. In addition, Hans Van de Groenendaal, ZS6AKV, has announced that SA AMSAT's Board has committed to a similar donation of $1,000. AMSAT NA gratefully acknowledges the support of the members of these fine organizations and the leadership of the Secretary of AMSAT UK and the Presidents of BRAMSAT and SA AMSAT.

Individual donations to the insurance fund are now needed to complete the final 50% of the goal. See *ASR* # 160 to see how to make your donation count.

AMSAT DL, partners with AMSAT NA on the Phase 3C Project, is also funding launch insurance but from independent sources.

Short Bursts

- Progress has been made with UO-11 and the spacecraft is now back transmitting telemetry after lengthy diagnosis at Surrey. They still need to carry out some further activities before normal service can resume but it is hoped that will occur very soon. Problems with a new FORTH DIARY system began in November.
- Add to the packet Bulletin Board list carried in *ASR* #162: IN Indianapolis KD9QB 145.01, 145.09, 223.40 Delete WB7QWG
- When, in *ASR* #162 we stated the AMSAT European 20 meter Net aired on Sundays, we erred. In fact it airs on Saturdays at 1000 UTC on 14.280 MHz with PAØDLO NCS.

No Threat To Satellite Operation IARU Asserts

The potential threat to 70 cm satellite operation in IARU Region 3 does not exist according to IARU authorities. In a recent communication, IARU Region 3 officials deny there was ever any serious plan to use 435 to 438 MHz for terrestrial FM. JARL was said to have never agreed to such a flagrant abrogation of coordinated bandplans.

The implication seems to be that offending portions of early drafts of a JARL 70 cm bandplan of which AMSAT became aware and which did propose FM use of the satellite sub-band would never have seen the light of day. They would simply have been deleted by senior JARL managers conversant with Region 3 stipulations it has been suggested.

Mechanical Glitch Threatens New European Broadcast Satellite

Potentially serious problems loomed in TVSAT-1's future according to reliable space industry sources. The newest commercial satellite was launched November 21 on Arianespace's V-20 mission. The launcher worked perfectly but a glitch has developed with the TVSAT-1 payload. According to European sources, one of the solar panels has failed to deploy properly. If uncorrected, this could reduce power availability by at least 50%. Plans were being formulated to attempt to jar the panel loose while the satellite was in its geosynchronous orbit by using all of the satellite's station-keeping thrusters ignited at once.

AMSAT was concerned this development would adversely affect the availability and rate for its launch insurance on Phase 3C. Late word has been received, however, that there will be no effect to AMSAT in terms of insurability.

RS-10/11 Passband Controls Portend Alligator Demise

According to an article in the October issue of the Russian magazine "RADIO", the transponders on RS-10/11 use a unique system for assuring alligators don't disrupt the entire 40 kHz passband. Each passband is divided into ten 4 kHz sections each with its own ALC. In this way an alligator in one section won't consume an inordinate amount of power from users of other sections. A translation of the "RADIO" article is being prepared by Dex Anderson, W4KM, and will appear in *ASR* when complete.

A similar system has been discussed for AMSAT's future satellites using Digital Signal Processing. The problem re-

maining to be solved with DSP application is one of processor speed needed to handle processing of the broad bandwidths, typically several hundred kilohertz wide, planned for AMSAT's future projects. When implemented, a fully "DSP'd" passband could offer the unusually effective deterrent to overpowered uplinks of actually providing a negative transfer function for offending stations.

In practice this would mean that once an uplink crossed a pre-determined threshold, if it got any stronger, the downlink would get weaker in proportion to further increases in uplink power; the opposite of what normally happens with a linear transponder such as currently used. The new RS-10/11 solution is to isolate the alligator in a small pool so he can't do too much damage. The DSP solution is to dynamically shape the transponder transfer function.

The future seems bleak indeed for would-be alligators!

Phase 3C Tests Called Unqualified Success

Dick Daniels, W4PUJ, who recently returned from Germany, reports the propulsion system tests and the shake and vibration tests on Phase 3C went perfectly. The spacecraft passed all the tests with flying colors. The tests were performed in Germany by AMSAT DL and various contractors the week of November 30. AMSAT NA is responsible for the major sub-assemblies of the liquid propulsion system. Phase 3C's bi-propellant system is similar to the one employed by AMSAT OSCAR 10 in that it uses the same MBB motor. Both use combinations of hypergolic fluids, UDMH (unsymmetrical di-methyl hydrazine) and nitrogen tetroxide. The fluids explode spontaneously on contact to produce thrust. A slightly improved version of these fluids will provide more thrust on Phase 3C compared to AO-10.

Of especial interest and a major achievement scored was the successful test of the new propulsion system plumbing and valves. This had represented a major risk area since Phase 3C employs a new design. The AO-10 valve system was abandoned since analysis of the performance of the AO-10 system indicated improvements were called for. The new system worked perfectly on its first try according to W4PUJ.

In related news, the rough time line for the AMSAT Phase 3C launch campaign was recently laid out. Based on an estimated launch date of March 24, the launch teams from AMSAT DL and AMSAT NA will be arriving in Kourou, French Guiana about mid-February.

Our Future In Space

Mr. Roy Neal, K6DUE Science Editor, NBC News (Retired)
(Courtesy of Westlink Radio News)

NASA took another big step toward a manned space station recently, when it announced contracts worth about $6.5 billion had been awarded to four companies: Boeing Aerospace, MacDonald-Douglas Astronautics, General Electric's Astrospace Division and the Rocketdyne Division of Rockwell. Those contracts should lead to a permanent base in orbit by the mid-1990's, unless Congress or a new administration have a change of heart. And what does all this mean to Ham radio?

It's possible that Astronaut Tony England, WØORE, expressed it best in the ARRL videotape "The New World of Amateur Radio" when he predicted that Amateur Radio will be an integral part of Space Station planning. Indeed, AMSAT and the ARRL have a plan to put voice, television and packet for Space Station into formal proposals in the near future, but Space Station will not be with us for some time.

Here are the near-future plans for manned flights and Amateur Radio. They currently center on Dr. Ron Parise, WA4SIR, a civilian Payload Specialist who is currently scheduled to fly on the space shuttle in mid-1989. Dr. Parise is a member of AMSAT and lives in Silver Spring, Maryland near the Goddard Spaceflight Center. He was slated to take up amateur equipment before the shuttle accident closed down the program. Now, NASA says that things are looking up. The agency hopes to get its shuttles back into space by the middle of 1988 and resume a more realistic slowed down launch schedule thereafter.

So it was good news when WA4SIR was scheduled to fly an early mission. AMSAT and the Hams at the Johnson Space Center in Houston, Texas — the group that put Owen Garriott, W5LFL, and Tony England, WØORE, on the air from orbit — are hard at work pushing through a proposal they believe the officials of the space agency will approve. It will call for uplinking some real-time television from earth to the shuttle as a demonstration using frequencies in the 70 cm band. It will also call for two meter voice, slow-scan TV and a heavy emphasis on packet radio. As before, an antenna in the window will probably be used.

And so, we Hams are following the space program very closely as always. It must be stressed, though, that all of this is tentative as of this writing. But Hams who have thrilled to space contacts in the past can look forward to a resumption of such activities once the shuttle program demonstrates that it has fixed its problems.

Reference Orbits For LEO OSCARs
For Monday, 28Dec87

Sat. Name	Ref Orbit Time (hh:mm:ss)	Ref Orbit Long. (deg W)	Orbit Number	Increments Orb. Per. (Min/orb)	Increments Long. (deg W/orb)	El. Set Basis
UO-9	00:55:13	84.8	34637	94.23	23.55	113
UO-11	00:29:01	39.3	20401	98.51	24.63	273
FO-12	01:01:02	321.8	6240	115.65	29.24	71
RS-10]* RS-11]*	00:50:36	193.8	2574	105.02	26.38	186

* RS-10 and RS-11 share the same spacecraft

Reference Apogee For AO-10

Date	Time (UTC)	Latitude North	Longitude West	Orbit Number	Element Set Basis
28Dec87	03:54:05	27.6	81.5	3415	318

Satellite	Oscar-9
Catalog number	12888
Epoch time:	87333.54059496
Element set:	113
Inclination:	97.6344 deg
RA of node:	355.6120 deg
Eccentricity:	0.0002732
Arg of perigee:	30.8710 deg
Mean anomaly:	329.2689 deg
Mean motion:	15.30764747 rev/day
Decay rate:	5.659e-05 rev/day^2
Epoch rev:	34202

Satellite	Oscar-10
Catalog number	14129
Epoch time:	87327.96232533
Element set:	318
Inclination:	27.4437 deg
RA of node:	351.0443 deg
Eccentricity:	0.6029311
Arg of perigee:	258.8025 deg
Mean anomaly:	31.7072 deg
Mean motion:	2.05880791 rev/day
Decay rate:	2.0e-07 rev/day^2
Epoch rev:	3345

Satellite	Oscar-11
Catalog number	14781
Epoch time:	87333.62136650
Element set:	273
Inclination:	98.0817 deg
RA of node:	36.0762 deg
Eccentricity:	0.0012693
Arg of perigee:	304.5142 deg
Mean anomaly:	55.4873 deg
Mean motion:	14.62194252 rev/day
Decay rate:	2.65e-06 rev/day²
Epoch rev:	19987

Satellite	mir
Catalog number	16609
Epoch time:	87341.85844159
Element set:	959
Inclination:	51.6286 deg
RA of node:	338.5311 deg
Eccentricity:	0.0012450
Arg of perigee:	97.4000 deg
Mean anomaly:	262.8788 deg
Mean motion:	15.79382634 rev/day
Decay rate:	1.5594e-04 rev/day²
Epoch rev:	10349

Satellite	Meteor 2-14
Catalog number	16735
Epoch time:	87329.03290708
Element set:	201
Inclination:	82.5421 deg
RA of node:	339.6092 deg
Eccentricity:	0.0014582
Arg of perigee:	166.1244 deg
Mean anomaly:	194.0319 deg
Mean motion:	13.83766305 rev/day
Decay rate:	6.0e-08 rev/day²
Epoch rev:	7560

Satellite	Meteor 3-1
Catalog number	16191
Epoch time:	87329.31129819
Element set:	717
Inclination:	82.5462 deg
RA of node:	278.6920 deg
Eccentricity:	0.0018780
Arg of perigee:	284.8347 deg
Mean anomaly:	75.0686 deg
Mean motion:	13.16933250 rev/day
Decay rate:	4.3e-07 rev/day²
Epoch rev:	10051

Satellite	Oscar-12
Catalog number	16909
Epoch time:	87325.82038634
Element set:	71
Inclination:	50.0155 deg
RA of node:	260.7925 deg
Eccentricity:	0.0010930
Arg of perigee:	326.0712 deg
Mean anomaly:	33.9410 deg
Mean motion:	12.44394195 rev/day
Decay rate:	-2.5e-07 rev/day²
Epoch rev:	5801

Satellite	Salyut-7
Catalog number	13138
Epoch time:	87341.91443346
Element set:	886
Inclination:	51.6113 deg
RA of node:	137.5582 deg
Eccentricity:	0.0001465
Arg of perigee:	135.6679 deg
Mean anomaly:	224.4430 deg
Mean motion:	15.31713700 rev/day
Decay rate:	2.464e-05 rev/day²
Epoch rev:	32260

Satellite	Meteor 2-15
Catalog number	17290
Epoch time:	87337.19903912
Element set:	123
Inclination:	82.4690 deg
RA of node:	244.4578 deg
Eccentricity:	0.0014188
Arg of perigee:	39.3605 deg
Mean anomaly:	320.8616 deg
Mean motion:	13.83572507 rev/day
Decay rate:	6.0e-08 rev/day²
Epoch rev:	4590

Satellite	noaa-9
Catalog number	15427
Epoch time:	87327.09516122
Element set:	220
Inclination:	99.0720 deg
RA of node:	294.2480 deg
Eccentricity:	0.0015825
Arg of perigee:	116.9892 deg
Mean anomaly:	243.2896 deg
Mean motion:	14.11532855 rev/day
Decay rate:	1.04e-06 rev/day²
Epoch rev:	15173

Satellite	RS-10/11
Catalog number	18129
Epoch time:	87335.92499754
Element set:	189
Inclination:	82.9241 deg
RA of node:	294.1586 deg
Eccentricity:	0.0011855
Arg of perigee:	167.5620 deg
Mean anomaly:	192.5403 deg
Mean motion:	13.71884799 rev/day
Decay rate:	6.4e-07 rev/day²
Epoch rev:	2216

Satellite	ajisai
Catalog number	16908
Epoch time:	87306.47344065
Element set:	62
Inclination:	50.0146 deg
RA of node:	320.1689 deg
Eccentricity:	0.0011300
Arg of perigee:	277.2304 deg
Mean anomaly:	82.7245 deg
Mean motion:	12.44369614 rev/day
Decay rate:	-2.5e-07 rev/day²
Epoch rev:	5561

Satellite	Meteor 2-16
Catalog number	18312
Epoch time:	87329.03753741
Element set:	67
Inclination:	82.5542 deg
RA of node:	311.2090 deg
Eccentricity:	0.0013280
Arg of perigee:	1.7850 deg
Mean anomaly:	358.3334 deg
Mean motion:	13.83329665 rev/day
Decay rate:	6.3e-07 rev/day²
Epoch rev:	1368

Satellite	noaa-10
Catalog number	16969
Epoch time:	87337.22210786
Element set:	96
Inclination:	98.6999 deg
RA of node:	5.7636 deg
Eccentricity:	0.0015063
Arg of perigee:	79.0420 deg
Mean anomaly:	281.2451 deg
Mean motion:	14.22531140 rev/day
Decay rate:	2.04e-06 rev/day²
Epoch rev:	6277

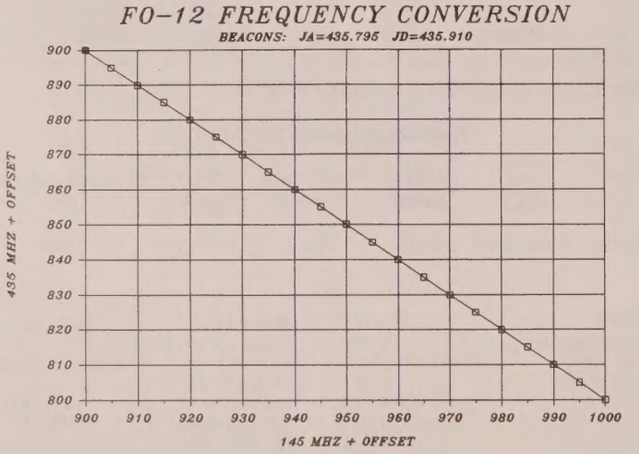
AMSAT® NA

The Radio Amateur Satellite Corporation

Post Office Box 27
Washington, DC 20044
(301) 589-6062

Non-Profit
Organization
Second Class
POSTAGE PAID
at
Waterbury, Conn.

FO-12 FREQUENCY CONVERSION



LM-1096 KA6M 99.81
MAGNUSKI, HANK
2019 BARBARA DR.
PALO ALTO CA 94303

Amateur Satellite Report (ISSN 0889-6089) is published biweekly for $16 (inseparable from annual membership dues of $24) by AMSAT, Post Office Box 27, Washington, DC 20044. Second class postage paid at Silver Spring, MD and additional mailing offices. POSTMASTER: send address changes to *Amateur Satellite Report*, Post Office Box 27, Washington, DC 20044.